

Lesson 3



Girl exploring globe

Which Biome Do I Call Home?

In this lesson, students learn about interesting and sometimes strange ways in which plants respond to the environments where they live. Students match colorful photo cards with descriptions of typical vegetation to each biome. They explore and share information about specific characteristics that enable plants to survive in each biome.

Learning Objective

Identify the characteristics of various biomes.



Continuing to work in their groups from Lesson 2, students use information on **Plant Characteristics Cards** (Visual Aids #10–14) to add to their understanding of biome characteristics. Groups share what they have learned with the rest of the class in short oral presentations. During these presentations, students complete the remaining two columns on their **World Biomes Task Sheet** (Lesson 2 Activity Master), adding information on common vegetation and plant characteristics. Students finish the lesson with a completed task sheet detailing Earth’s nine biomes.

Finally, groups add their information cards to the existing wall display, linking representative vegetation to the already-posted climatograms for each biome.

Background

Because each biome has a characteristic climate, the characteristics of vegetation across a biome are similar, despite the fact that different ecosystems within a biome may have different plant species. The characteristics are similar

because these plants are all adapted to the same climate.

For example, ecosystems in the desert biome on different continents have different plant species, but all of them have adaptation to help them obtain water in their dry environment. Some of these adaptations include long taproots and the ability to store water. Plants in semiarid biomes, such as chaparral, have similar adaptations. In chaparral, savanna, and grassland biomes, many plants are adapted to periodic burning; in fact, some require fire to reproduce.

Rainforest plants face the opposite challenge; if they remained constantly wet, they would be vulnerable to mold and mildew. Thus, upper canopy leaves have “drip spouts” allowing rain to run off. Rainforest trees have tall, straight trunks that branch at great heights to compete for sunlight. Understory leaves are very large, to gather as much sunlight as possible in the shaded environment.

Alpine plants are adapted to extremes of cold, wind, and ice. By growing low to the ground, many of these plants are below the snow and blowing ice in winter. Despite much rain and cloud moisture, alpine plants are actually subject to drought. The thin soils do not hold water well, and the persistent wind dries out leaves. As a result, many alpine plants, like those in arid environments, develop a waxy cuticle that covers leaf surfaces and seals in moisture.

Key Vocabulary

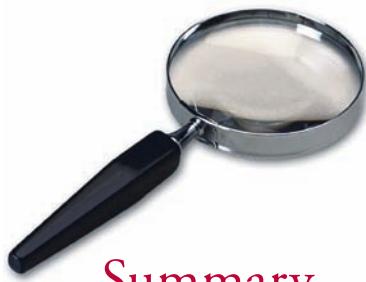
Characteristic: A quality that makes an individual or group different from others.

Vegetation: The plant life found in an area or region.



Toyon resprouting after fire

Toolbox



Summary of Activities

Students study cards showing plant characteristics for each of the nine biomes, extending their knowledge to include typical vegetation and characteristics that enable plants to survive in each biome. Students take notes from short oral summaries to complete their biomes charts.



Instructional Support

See Unit Resources, page 36

Prerequisite Knowledge



Students should know that:

- organisms depend on abiotic components of the ecosystem, such as water.
- organisms compete with other organisms for resources.
- organisms must be able to survive within the constraints of the environment in which they live.
- plants lose water through evaporation from their leaves.

Students should have:

- completed Lesson 2.

Advanced Preparation



Gather and prepare Activity Masters:

- Gather from previous lessons:
 - Student copies of **World Biomes Task Sheet** from Lesson 2
 - Student copies of the **Unit Dictionary**

Gather and prepare Materials Needed:

- Cut nine six-inch lengths of string, one string for each biome.

Gather and prepare Visual Aids:

- Prepare the **Plant Characteristics Cards**.



Materials Needed



Activity supplies:

- String or yarn: 6 feet per class

Class supplies:

- Pushpins

Unit Dictionary:

- Provided separately

Visual Aids



Photo Cards:

- Plant Characteristics Cards, Visual Aids #10–14

Duration



Preparation Time

15 min.

Instructional Time

45 min.



Safety Notes

None

Activity Masters in the Supporting Materials (SM)

No activity masters are required for this lesson.

Procedures

Vocabulary Development

Use the **Unit Dictionary** and the **Vocabulary Word Wall Cards** to introduce new words to students as appropriate. These documents are provided separately.

Step 1

Review the nine biomes by pointing to the **Biome Wall Display** (three posters of **World Biomes** and the **Biome Cards**, climatograms). Ask students to name each biome and describe its location and climate.

Step 2

Organize students into the same groups as in Lesson 2. Give each group the appropriate **Plant Characteristics Cards** (Visual Aids #10–14) for the biome they studied during Lesson 2. Ask students to define the words “characteristic” and “vegetation.” Explain that the cards describe the type of vegetation typically found in each biome, along with specific characteristics that help plants survive the environmental conditions in that biome.

Step 3

Return each student’s partially completed **World Biomes Task Sheet** (Lesson 2 Activity Master). In their groups, ask students to read the information on their biome’s **Plant Characteristics Card** and fill in the appropriate “typical vegetation” and “plant characteristics” columns on their task sheets. Point out that each card features one plant that is typical of the biome and has an interesting characteristic that helps the plant survive the conditions found there.

Step 4

Give groups a few minutes to prepare to share a description of their biomes that relates latitude, precipitation, temperature, type of vegetation, and characteristics of plants found in the biome.

Step 5

Have each group in turn stand next to the **Biome Wall Display**. Ask the group to point out the location of their biome occurs and to describe the biome to the rest of the class. While they present the information, have the remaining students take notes in the appropriate columns on their individual **World Biomes Task Sheet**.

Step 6

Have one member of each group post their **Plant Characteristics Card** next to their already posted **Biome Card** and climatogram on the **Biome Wall Display**. Use the string and pushpins to continue the connection of the cards to the map. If time allows, ask students to move from card to card, checking to see that they recorded the information correctly.

Step 7

For homework, ask students to finalize their **World Biomes Task Sheet**, using their **Unit Dictionary**, information from the **Plant Characteristics Cards**, and any other resources available. They should describe at least two plant characteristics.



Lesson Assessment

Description

This lesson enables students to identify more fully the characteristics of all nine world biomes. In the previous lesson, students identified the location, climate, and general appearance of each biome. In this lesson, they study typical vegetation and characteristics of common plants. In particular, students identify characteristics that enable plants to survive each biome's unique environment.

The descriptions students share in Step 5 indicate whether groups are able to extract relevant information about their assigned biome. Their completed **World Biomes Task Sheet** (Lesson 2 Activity Master) demonstrates the extent to which students can identify the characteristic vegetation of various biomes.

Suggested Scoring

Score the completed **World Biomes Task Sheet** by awarding one point for each newly completed cell in the table, for 18 possible points.

Answer Key and Sample Answers

World Biomes Task Sheet

Lesson 2 Activity Master | page 1 of 4

Name: _____

Part 1

Fill in the location and the climate boxes for each of the biomes listed. Use the **Unit Dictionary**, the classroom posters, and the Internet if it is available to help you. List two or more points in each box.

Part 2

As groups give their presentations, take notes and fill in the typical vegetation and plant characteristics boxes. List two or more points in each box. You may also add information to the location and climate boxes if you learn something new.

Note: *This assignment is completed over Lessons 2 and 3. Here the Answer Key includes all of the answers from both lessons.*

Answer Key and Sample Answers

World Biomes Task Sheet

Lesson 2 Activity Master | page 2 of 4

Name: _____

Location	Climate	Typical Vegetation	Plant Characteristics
<i>Middle latitudes</i> <i>Coastal areas of most continents</i> <i>Found in California foothills</i> <i>Covers 10% of California</i>	<i>Mild, wet winters</i> <i>Hot, dry summers</i> <i>Frequent fires</i>	<i>Shrubs that grow close together</i>	<p><i>Leaves drop during drought.</i> <i>Smaller leaves with less surface area mean less water loss in summer.</i> <i>Waxy coating on leaves reduces evaporation.</i> <i>Shallow roots collect rain, and taproots collect deep water.</i> <i>Can grow back from base if burned in a fire.</i> <i>Some seeds sprout only after being heated by a fire.</i></p>
	<i>Subtropical</i> <i>Between forest or woodland and grassland or desert</i> <i>Covers large areas of India, Africa, Australia, and South America</i>	<i>Warm to hot</i> <i>Wet and dry seasons</i>	<p><i>Mostly grasses with scattered shrubs and trees</i></p> <p><i>Leathery leaves keep plants cool and reduce water loss.</i> <i>Leaves hang so less surface is hit by sunlight.</i> <i>Shallow roots capture rainwater, and taproots capture deep water.</i> <i>Some trees have lignotubers to help them grow back after fires.</i></p>
	<i>Interior of continents in temperate latitudes</i> <i>Found in very large patches</i> <i>Flatland areas</i>	<i>Large temperature difference between summer and winter</i>	<p><i>Mostly grasses and small plants, very few trees</i></p> <p><i>Tough cases protect seeds from fire.</i> <i>Can become dormant in dry periods.</i> <i>Extensive root systems help store water and nutrients to survive winter.</i> <i>Top of plants die back, but plants grow back from roots.</i></p>

Answer Key and Sample Answers

World Biomes Task Sheet

Lesson 2 Activity Master | page 3 of 4

Name: _____

Location	Climate	Typical Vegetation	Plant Characteristics
Hot deserts in California and southwest U.S., South America, Africa, Australia and Asia Further from the equator than grasslands and savanna Cold deserts in Antarctica and Greenland	Can be very hot or very cold Very little rain	Low, scattered bushes and shrubs, wildflowers, a few small trees, cacti in North and South America	<p>Cacti expand to store water.</p> <p>Waxy leaves and skin keep water from escaping.</p> <p>Roots are shallow and widely spread to gather any rain that falls.</p> <p>Some have taproots to reach deep sources of water.</p> <p>Spines keep animals from eating moist plant parts.</p> <p>Plants have few or no leaves to prevent water loss from evaporation.</p> <p>Plants can stay dormant until there is water available.</p> <p>Hardy seeds survive underground and wait for good conditions.</p> <p>Grow fast to take advantage of limited water supply.</p>
	Tropical: near the equator Temperate: coastal California, Oregon, and Washington	Large, tall, straight trees, vines, epiphytes More plant species than any other biome	<p>Leaves are shaped so water will run off to prevent branches from breaking.</p> <p>Trees are straight and tall and leaf out at the top to compete for sunlight.</p> <p>Epiphytes grow in tree branches so they can get light.</p> <p>Vines use trees for support; some strangler vines kill their hosts and take its nutrients.</p> <p>Trees have broad bases for support in damp soil.</p> <p>Because of the canopy above, large leaves on ground plants capture limited sunlight.</p>
	Middle latitudes Most are located in the eastern United States, Canada, Europe, China, Japan, and parts of Russia.	Four distinct seasons Cold winters, warm summers Precipitation moderately high year-round	<p>Trees that lose their leaves in winter</p> <p>Smaller trees, shrubs, ferns, mosses, lichen</p> <p>Avoid damage to leaves by dropping them before temperatures turn too cold.</p> <p>Tall, spreading trees capture sunlight for photosynthesis.</p>

Answer Key and Sample Answers

World Biomes Task Sheet

Lesson 2 Activity Master | page 4 of 4

Name: _____

Location	Climate	Typical Vegetation	Plant Characteristics	
<p>Largest biome Found in a broad band across North America, Europe, and Asia, south of the Arctic tundra</p>	<p>Long, cold winters Mild, wet summers</p>	<p>Tall coniferous trees, few smaller trees, shrubs, ferns, mosses</p>	<p>Being evergreen means trees do not need extra energy to grow new leaves in spring. Thin needle leaves help trees save water in winter, when moisture is tied up in snow and ice. Dark green color of needle leaves absorb sunlight that is limited during short growing season. Snow slides off needles so the weight of the snow does not break branches.</p>	
<p>Found in the Arctic Circle and the Antarctic</p>	<p>Coldest of all biomes Frozen much of the year Very little precipitation</p>	<p>Lichens, mosses, and small shrubs that grow low to the ground</p>	<p>Plants grow short and low to the ground to stay warm and to avoid strong winds. Plants survive short days by photosynthesizing in low light conditions. Some, like lichens, go dormant until there is enough light and water. Small leaves avoid water loss through leaf surface. Some can grow under snow. Shallow root systems because of permafrost. Grow and reproduce quickly during time active layer is free of ice.</p>	
<p>Alpine</p>	<p>Tundra/polar</p>	<p>Found at all latitudes in high elevations (mountain areas)</p>	<p>Very cold in winter, mild during the short summer Gets colder at higher elevations</p>	<p>Small groundcover plants Can withstand low moisture. Small leathery leaves conserve water. Shiny leaves reflect intense sunlight. Become dormant during winter; above-ground parts of plant die back. Use food stored in stem to start growing until soils thaw and roots can absorb water and nutrients.</p>

10 Plant Characteristics Cards

Visual Aid — Photo Cards



Jarrah Tree

Manzanita



Plant Characteristics: Some savanna plants have small, thick leaves. Small leaves do not lose as much water through evaporation as do large leaves. Some trees have shallow roots that can grow wide around the base of the trunk. Some plants have shallow roots that can grow deep below the surface. Like a jarrah tree, some plants grow only after a fire has burned.

Typical Vegetation: Shrubland that grows close together.

Plant Characteristics: Most chaparral plants have small, thick leaves. Small leaves do not lose as much water through evaporation as do large leaves. Some trees have shallow roots that can grow wide around the base of the trunk. Some plants have shallow roots that can grow deep below the surface. Like a jarrah tree, some plants grow only after a fire has burned.

Biome: Chaparral

Typical Vegetation: Scrubland that grows close together.

Plant Characteristics: Most chaparral plants have small, thick leaves. Small leaves do not lose as much water through evaporation as do large leaves. Some trees have shallow roots that can grow wide around the base of the trunk. Some plants have shallow roots that can grow deep below the surface. Like a jarrah tree, some plants grow only after a fire has burned.

Biome: Savanna

Typical Vegetation: Grasses with scattered trees and shrubs.

Plant Characteristics: Some savanna plants have small, thick leaves. Small leaves do not lose as much water through evaporation as do large leaves. Some trees have shallow roots that can grow wide around the base of the trunk. Some plants have shallow roots that can grow deep below the surface. Like a jarrah tree, some plants grow only after a fire has burned.

Biome: Savanna

Typical Vegetation: Grasses with scattered trees and shrubs.

11 Plant Characteristics Cards

Visual Aid — Photo Cards



Saguaro Cactus

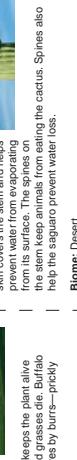


Buffalo Grass

Plant Characteristics: The saguaro cactus is found in the deserts of southern California, Arizona, and northern Mexico. Saguaros have very tall, thick stems. The fleshy pulp inside the stem can expand like an accordion. This helps the saguaro store water when it is available. A waxy skin covers the stem and traps water from rainwater falling on its surface. The saguaro also has long, sharp spines along its stem to protect it from water loss.

Biome: Desert

Typical Vegetation: Low, scattered bushes and shrubs. Spines also help the saguaro prevent water loss.



Manzanita

Plant Characteristics: Desert plants live in a very dry environment. Because there is little rainfall, these plants must be able to save and conserve water. They often have small leaves or spines. These prevent water loss through evaporation from leaf surfaces. Many have spines, which shade the plant and help keep it cool. Spines also keep animals away from the plants. In long periods of dry weather, many desert plants shut down their life functions. This is called going dormant. Dormant plants can spring to life when water becomes available.

Biome: Desert

Typical Vegetation: Low, scattered bushes and shrubs. Some small trees, wildflowers, and cacti in North and South America.

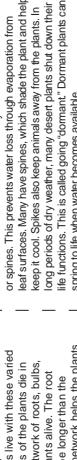


Jarrah Tree

Plant Characteristics: Some savanna plants have small, thick leaves. Small leaves do not lose as much water through evaporation as do large leaves. Some trees have shallow roots that can grow wide around the base of the trunk. Some plants have shallow roots that can grow deep below the surface. Like a jarrah tree, some plants grow only after a fire has burned.

Biome: Savanna

Typical Vegetation: Grasses with scattered trees and shrubs.



Manzanita

Plant Characteristics: Some savanna plants have small, thick leaves. Small leaves do not lose as much water through evaporation as do large leaves. Some trees have shallow roots that can grow wide around the base of the trunk. Some plants have shallow roots that can grow deep below the surface. Like a jarrah tree, some plants grow only after a fire has burned.

Biome: Savanna

Typical Vegetation: Grasses with scattered trees and shrubs.

12 Plant Characteristics Cards

Visual Aid — Photo Cards



White Oak Tree



Plant Characteristics: White oaks are among the most common trees in deciduous forests in the eastern United States. They have large leaves that grow high in the forest canopy, when there is plenty of sunlight. Epiphytes get their nutrients directly from them, then fall, white oaks—and all deciduous plants—drop the tree to the ground.

Biome: Deciduous Forest

Typical Vegetation: Large trees that lose their leaves in fall. Small trees, shrubs, ferns, mosses, and lichen, in fall.

Plant Characteristics: The climate in the deciduous forest biome usually is not too cold or too hot. Because of this, many different plants can live in this biome. The plants must be able to survive four distinct seasons: spring, summer, fall, and winter. During the cold winter, little water is present, so the trees protect themselves from losing too much water by dropping their leaves in the fall. Losing their leaves also protects the trees from damage by the cold temperature. The leaves grow back in the spring as the days lengthen and water and nutrients become available.

Deciduous trees grow tall to capture the sunlight. Their branches spread wide to collect sunlight for photosynthesis. Their wide root systems collect water and nutrients from the area around their trunks.

Biome: Deciduous Forest

Typical Vegetation: Large trees that lose their leaves in fall. Small trees, shrubs, ferns, mosses, and lichen, in fall.

Plant Characteristics: Orchids are a type of flowering plant that grow in the tropical rainforest. They have a unique shape that also helps them survive dry periods. Orchids produce a huge number of tiny seeds that a wind can easily carry. If not for this important feature, few orchid seeds would reach the forest floor.

Biome: Rainforest

Typical Vegetation: Very tall trees with high branches, many vines and epiphytes, ferns and flowering plants on the forest floor; trees; large-leaved plants; and seedlings on the forest floor.

Plant Characteristics: Rainforest trees grow very tall and straight to compete for sunlight. The higher they reach, the more sunlight they can capture. The leaves on the high branches are small and thin to reduce water loss. The trees have a large root system to anchor them to the wet ground. They have a large root system to anchor them to the wet ground. There are many epiphytes—vines and flowering plants growing high in the leafy branches. Some “strangler” vines use the trees as support. Many of the tall trees have broad bases, and dark, moist plants on the ground have large leaves to capture as much sunlight as possible.

Biome: Rainforest

Typical Vegetation: Very tall trees with high branches, many vines and epiphytes, ferns and flowering plants on the forest floor; trees; large-leaved plants; and seedlings on the forest floor.

13 Plant Characteristics Cards

Visual Aid — Photo Cards



Reindeer Moss



Plant Characteristics: Despite its name, reindeer moss is actually lichen. Lichens are made up of fungi and algae growing together on a rock or tree trunk. The fungi support and protect the algae. The algae photosynthesize and produce food for the fungi. The fungi help the algae to live after snow falls. Some lichens can live on rocks because they can hold onto moisture even in low temperatures and even in low light conditions. Lichens are not a easily damaged by frost. With these characteristics, lichens can survive in the Arctic tundra. When there is not enough water or light, lichen can dry out and go dormant until conditions change. Even after long dormant periods, they can begin to grow again.

Biome: Tundra

Typical Vegetation: Low shrubs, mosses, lichens, liverworts (moss-like plants), and grasses.

Plant Characteristics: The Siberian spruce is one of many conifers of the taiga biome. Conifers are trees with needle-like leaves and cones. They do not drop their needles. Evergreen trees, like reindeer moss, keep snow from building up on their branches. In tundra winters, the ground is frozen and little snow is available to the trees. Coniferous trees have small leaves that hold onto water through evaporation. Most tundra plants are dormant in winter.

Biome: Taiga

Typical Vegetation: Tall conifers; few smaller trees, shrubs, ferns, and mosses on the forest floor.

Plant Characteristics: Taiga plants must survive cold, long winters. They grow and reproduce only during the short summer seasons. Most plants in the taiga biome are conifer trees. Their cone-like shapes keeps snow from building up on their branches. In tundra winters, the ground is frozen and little snow is available to the trees. Coniferous trees keep their needles throughout the winter. Taiga trees have needles that release a lot of energy. The soil in the taiga does not contain many nutrients, and the Sun is usually low in the sky in these regions. The resources for plant growth are limited. As soon as temperatures start to warm, the dark green needles absorb sunlight. The trees are ready to photosynthesize and take advantage of the growing season.

Plant Characteristics: There are two layers to the Arctic ground. The permafrost layer is permanently frozen. Neither plant roots nor water can make their way into the permafrost. Therefore, tundra plants have shallow roots. Above the permafrost, the surface layer thaws each summer. Flowering plants grow and reproduce quickly during the short season when the ground is free from ice.

14 Plant Characteristics Cards
Visual Aid — Photo Cards

